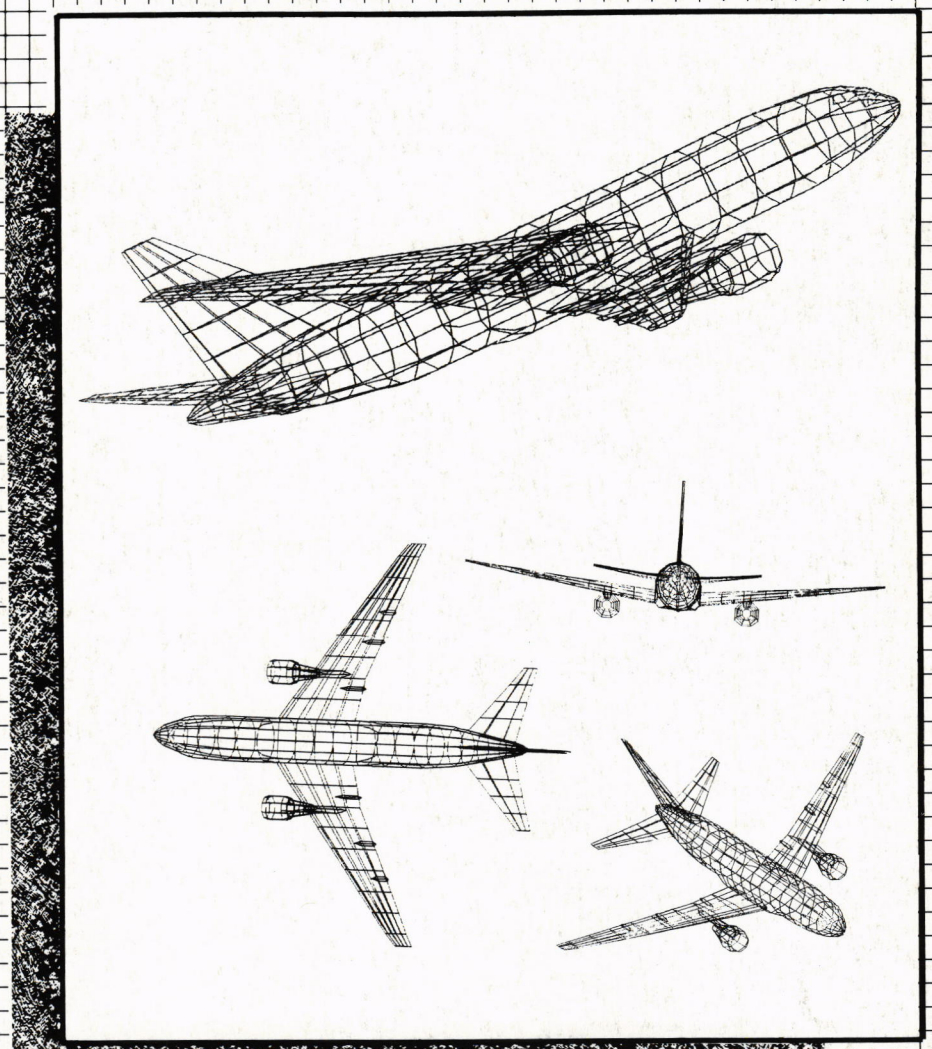
MECHELECIV resurfaces

Vol. 30 No. 3 Nov. — Dec. 1983

MECHELECIV



MINI BAJA: GW'S DETROIT

INDUSTRIAL ARCHAEOLOGY

RECIPES FOR THE RESUME

FASCINATION WITH COMPUTER GRAPHICS

THE FUTURE OF FIGHTER AIRCRAFT

Official Publication of the Engineers' Council
The George Washington University, Washington, D.C.

DEDICATED TO THE STUDENTS OF THE SCHOOL OF ENGINEERING AND APPLIED SCIENCE

MECHELECIV

Vol. 30 No. 3 Nov/Dec 1983 QUARTERLY STUDENTS' MAGAZINE

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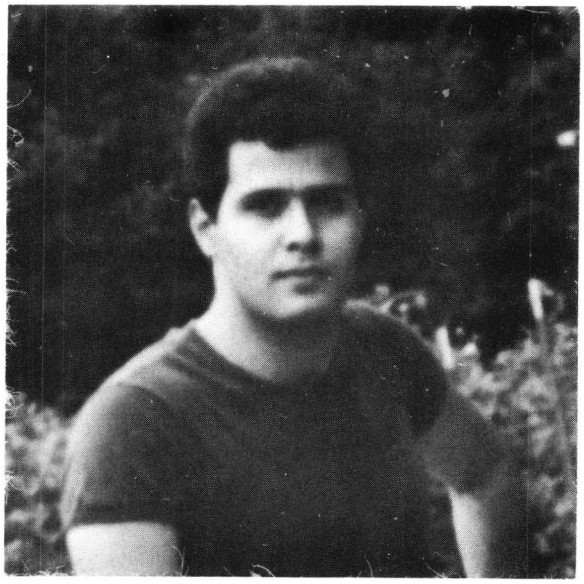
The content of this magazine represents the individual expressions of the authors or editors and does not necessarily reflect the views or attitudes of the student body or of the University administration.

In Memoriam



MOHAMMAD MEIMAND

1961 - 1983

Mourned and Remembered by his Friends and Peers

Revival of the MECHELECIV

This issue ushers in the revival of the MECHELECIV — the official publication of the Engineering School student community. From the early forties to the early seventies MECHELECIV was a well-read and well-circulated magazine — having come into existence before Tompkins Hall became part of the GW landscape and before the School of Engineering in its present form became part of the administrative structure of the University.

With this issue we intend to re-initiate the tradition MECHELECIV established: of providing a forum for discussion of issues pertaining to the School; of bringing together an otherwise diverse community consisting of part-time and full-time faculty, undergraduate and graduate students, full-time and part-time students, alumni and staff; of making the Engineering School and the University visible among other educational institutions (both local and national) and the Engineering community at large; and of presenting news and features relevant to the community it serves.

In the spirit of MECHELECIV tradition, the editorial staff will not dictate the style or content of articles printed in the magazine. However, it will maintain strict control over the quality of material published. In this way, the staff hopes to produce a magazine which will be a source of pride and enlightenment unifying the Engineering School community, while providing a superior journal of news and discussions for all.

In the fourties, the second world war and its profound influence on academic and social life was reflected in the MECHELECIV. — In the fifties, the magazine was a forum for presenting topics like the return to civilian life after the war and its effect on student demography and attitudes; the establishing of the present day School of Engineering with the construction of Tompkins Hall; the dedication of the Davis-Hodgkins House to the students of the Engineering School; and the advent of the jet airliner. In the sixties, the Vietnam war and student activism and unrest found their expression in MECHELECIV as well. Space technology and manned space flights were also source of the major themes of the magazine during this period.

As the School of Engineering and the University community evolved, issues and news changed and MECHELECIV evolved with them. MECHELECIV will continue to evolve to reflect the current situation. The situation today is a result of some substantial changes that have taken place, especially during the period of over a decade when MECHELECIV was not being published.

The demography of the school has changed dramatically. Full-time faculty has increased from 32 in 1968 to over 75 currently. The combined total of full-time and part-time faculty is over 300 now compared to 70 in 1968. Total student on-campus enrollment has doubled from 1,292 in 1968 to approximately 2,600 now. This includes an even more subtantial increase in undergraduate enrollment from 259 in 1968 to about 1,000 currently. In addition to this, there are about 700 students who are registered off-campus. Currently, almost half of the students in the Engineering School come from countries other than the United States. This gives the school a cosmopolitan image and a unique opportunity to use this multi-cultural environment as a source of broader education for the University community.

There have been other changes as well. The school now offers a wider variety of degrees and courses. Due to the efforts of some individual faculty members, the school now posesses an array of state-of-the-art high technology equipment. The sponsored research program has expanded considerably. Another area of dramatic change has been tuition, which has increased by more than 100 percent in only the last four years. The job market has changed too. The increasing demand for Electrical Engineers and computer scientists as well as an increaed need for management and production efficiency, has provided many department within the Engineering School with challenges that demand considerable changes in the direction and quality of the education offered.

All these factors demand of the University administration innovation and flexibility as well as increased sensitivity towards the needs and perceptions of all segments of the University community in order to remain financially stable and affordable while becoming academically competitive and socially attractive.

Through its circulation within the School of Engineering and the University; to its advertisers and contributors; to all member schools of Engineering College Magazine Association; to many area High Schools and Colleges; and to many professionals and organizations, MECHELECIV will serve as a semi-technical medium of communication both within the Engineering School community as well as between the GW community and the academic and business community at large. The ensuing pages include more detail about the structure and working of the magazine as well as information regarding mailing and subscriptions.

We look forward to a productive and rewarding era for the MECHELECIV.

Abid Kamran

Editor

Letters to the Editor

THE
GEORGE
WASHINGTON
UNIVERSITY
Engineer Alumni Association / Alumni House / Washington, D.C. 20052 / (202) 676-6435

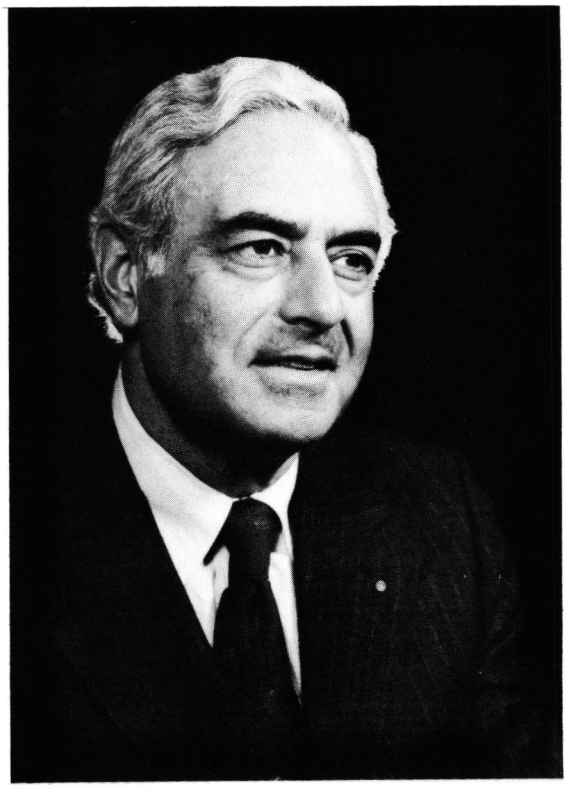
October 12, 1983

FROM: Eric S. Mendelsohn, EAA President

TO: Abid Kamran, EC President

The renewal of MECHELECIV's publication is highly satisfying and comes at a time when there is new interest in engineering education. We of the engineer alumni association recognize the concern among the students for excellence which this magazine represents. We hope that the alumni, students and faculty who receive this first issue will help to sustain it through written contributions and subscriptions. As a student in the early 60's, I remember the many excellent student articles and information items in each issue. Like many others, I saved a number of issues. I hope this first issue will thus be the first of another successful series which today's students will also appreciate.

LETTERS TO THE EDITOR POLICY: The opinions set fourth in the "Letters to the Editor" page of this magazine are not necessarily the opinions of the staff of the MECHELECIV. This page is set aside each issue for use by students, alumni, faculty and staff of the School of Engineering and Applied Science. The staff will also accept letters from other sources if the letters concern the magazine or would be of interest to the School of Engineering community. MECHELECIV reserves the right to edit or omit any letter if lack of space deems it necessary, or if a letter appears to be unprintable in the opinion of the Editorial staff. All letters must be signed; however, pen names may be substituted if requested.



From the Dean

The rapid pace of today's technological advancement portends changes in our way of living undreamed of just a few years past. These ongoing technological changes will require an extensive recreation of the world in which we live. Where we work, when we work, and what work we do will undergo changes unlike any we have yet experienced. All this will occur at a pace that will stress the fabric of societies.

The need for well-educated, highly motivated engineers has never been greater, nor have the demands placed upon them been more intense. The School of Engineering and Applied Science constantly strives to provide the high quality education needed by these engineers to meet today's challenges.

The school continues to enroll better qualified undergradute students each year. Over the past six years, our undergradute enrollment has risen from 740 in 1978 to 962 for the Fall 1983 semester. During this same period, average SAT scores have risen from 1130 to approximately 1180 for this year's entering freshman class. Similarly, over the past six years, enrollment for advanced degrees have increased over 13 percent.

The school's curricula are strong and dynamic. Timely changes are made to assure that the curricula provide the students the knowledge required in the fields of changing technology. As it has in the recent past, emphasis will continue in such areas as computer science, computer-aided design and manufacturing, quality controlled, communications, risk assessment and reliability, systems analysis and modelling as well as in the general fields of engineering.

Continuing effort is made to expand University-Industry-Government cooperation. By so doing we are broadening opportunities for research, work experience, employment opportunities and access to industrial know how. Our efforts in this endeavor have been successful.

On June 21, IBM announced that the School of Engineerig and Applied Science had been selected, along with 19 other colleges and universities from among 115 applicants, to receive a large, graphics-oriented IBM 4341 computer system with extensive software and peripheral equipment, and 17 high resolution engineering workstation type terminals. Also included in the grant is an extensive array of graphics, computer-assisted desgin (CAD), and computer-assisted manufacturing (CAM), software which will especially valuable to SEAS Departments' programs.

The School's sponsored research projects continue at a rate of over $7,000,000 per year, comprised of 78 projects from 17 different corporations or agencies. The Industrial Liaison Program, numbering eleven important organizations in the field of Electrical Engineering and Computer Science, and the Continuing Engineering Education Program which consists of over 500 courses a year presented to approximately 10,000 worldwide participants further contribute to the School's involvement with industry. These integrated activities provide additional opportunities for advanced study, training, and employment.

Although SEAS has been able to make some significant improvements over the years, there are three areas wherein I believe we must exert concerted effort. They are (1) raising the present high quality of our undergraduate, graduate and professional programs; (2) increasing our sponsored research and grants; and (3) modernizing and increasing our engineering facilities.

With the continuing dedication and effort of our students, faculty, alumni, and friends we will increase our academic excellence and our service to mankind. The engineering challenges of today can be an inspiration for us all.

Harold Liebowitz
Dean

COMPUTER GRAPHICS
Fundamental Concepts

by

H. Factors

If a (static) picture is worth a thousand words, then surely a moving, interactive one must be worth at least a thousand times more. And certain of them are,the ones produced by state of the art high performance color raster graphics systems (such as the Ramtek 9400) for instance. Such pictures typically require 2 or 3 million words (bytes) of memory to refresh (i.e., draw) them. This is memory dedicated just to holding the picture, and is not for any computation that may be required to generate it.

Today signs of the "video revolution" are everywhere in games, movies and even rock music. Computer graphics represents the merging of this visual technology (i.e., the video display system) with the computer. Affordable computer graphics has been made possible by low cost television hardware and microcomputer technology. It is the reduction in cost more than anything else that accounts for the rapid growth of the industry. But computer graphics is more than just a catchy way to display the information from a computer or communication system. In many cases it is the only way in which a human user can interpret the vast quantities of information available in a reasonable time. Interactive computer graphics additionally provides the ability to directly modify this data and the way it is presented.

Computer graphics systems are unique in their ability to present large quantities of data in a readily interpretable way. This ability gives such systems an important and perhaps soon to be essential place in a society increasingly dependent on information processing. In the not too distant future, when developments in computers and communication systems will allow immediate access to large quantities of information and powerful data processing facilities, interactive graphics will be the normal mode of providing this access.

There are many areas in which interactive computer graphics is useful. In some applications such as computer animation, sketching, graphic arts, and flight simulation, the picture is itself the primary item of interest. In other applications such as computer aided design (CAD), computer aided engineering (CAE), and air traffic control, it is an aid to visualizing a complex situation being modelled or simulated. Interactive computer graphics provides information in a way that users can readily respond to, as well as providing the means by which to respond.

Interactive computer graphics then is a vital component of the "information age" and provides (with natural language recognition) the most powerful and natural way of communicating with a computer system. It is illuminating to examine more deeply the technology behind these facilities.

Like most of computer science, interactive computer graphics is a combination of hardware and software technologies. The software consists of the predefined programs that are provided to facilitate the use of the specialized hardware.

Hardware

The hardware consists of the output equipment that generates and displays the picture, as well as the input devices that transmit the user's commands to the system. Input devices comprise keyboards, joysticks, trackballs and buttons- devices familiar to any video game addict, as well as pointing devices such as lightpens, touch screens, and mice.

The output system is made up of 3 main parts: (a) the display device on which the picture appears, e.g., a CRT or a printer; (b) image generation hardware which produces control signals to move the electron beam of the CRT or the printhead of the printer; (c) a computer which translates the high level graphics program into the primitives of the image generation system.

Although display devices for graphics include mechanical plotters and printers, for interactive computer graphics we are concerned mainly with the "video" devices, i.e., those that employ a cathode ray tube (CRT). Because of the dynamic characteristics of such a device, several dozen new images can be displayed every second to create the illusion of continuous motion and change in real time. A CRT is essentially a screen coated with light-emitting phosphors which are excited by a source of electrons. There are two kinds of CRT's used in interactive graphics. In one type -- the so-called refresh CRT's, the electron source is in the form of a narrow beam which is scanned over the surface of the tube rapidly enough to create a continuous picture. Since the phosphors only glow while the electron beam excites them, the beam must be continuously rescanned over the screen to maintain or "refresh" the picture from the stored representation in memory. In the other type of CRT called the direct view storage tube (DVST), the picture is stored as a charge distribution on the inside of the screen itself, on top of the phosphors. A flood of electrons from the electron source then excites all parts of the screen which are uncharged (the charged areas prevent electrons from reaching the phosphors). A separate "writing" electron beam similar to that found in refresh

devices is used to charge appropriate areas of the screen.

In all cases, an essential part of the image generation system is the electronic circuitry used to direct the electron beam to different parts of the screen. This is basically the same as the deflection circuitry found in oscilloscopes and television sets: two crossed magnetic or electrostatic fields in the neck of the CRT deflect the beam either up-down or left-right in proportion to the applied signal.

Output devices come in two varieties, "random scan" or "vector" devices, and "raster scan" devices. The difference is in the image generation system. In all graphics systems the picture to be drawn is organized by the display processing unit (DPU) as a sequence of lines. In random scan devices the deflection circuitry is driven from the line definition so the electron beam draws the lines one after another. In raster scan devices the lines are digitized and written into a rectangular memory array called the refresh buffer. A separate image display system then scans each row of the array to display the picture. The deflection pattern is therefore fixed, left-to-right, top-to-bottom. Ordinary home television sets are raster scan devices. Oscilloscopes and DVST's are both random scan devices. A major advantage of raster devices is that they can generate full-color pictures. Most vector devices are monochrome ("black and white").

Software

Although early work in interactive computer graphics was concerned mainly with developing the hardware, most of the recent emphasis has been on the software and firmware to control the equipment. Ideally one would like to simply give the system a high level description of the appearance of objects and have it automatically generate the picture. A significant amount of software is required to translate this high level description into the beam deflections and intensities required for displaying the picture. For many years, each graphics system came with its own translation software which was not compatible with the software from other manufacturers, and often not even compatible with other systems from the same manufacturer.

A breakthrough came in 1977 with the development of the first widely accepted device-independent graphics subroutine package by the Graphics Standards Planning Committee of the ACM Special Interest Group in Graphics. Five years later a similar system called GKS was accepted as an international standard. In both packages, the picture to be displayed is described to the system as a sequence of "output primitives" which are lines, characters, polygons, or points. Related output primitives are arranged in groups called segments so that they can be manipulated as a whole, e.g., a segment may be rotated or scaled. To provide additional flexibility, the output primitives may be specified in any desired units, e.g., feet, micrometers, parsecs, etc. These units define the "world coordinate system" in which the primitives are defined. A different coordinate system - the "physical device coordinate" system - describes the viewe surface. Output primitives in the "world" are automatically mapped to the screen by a "viewing transformation". Specifically, the viewing transformation maps primitives in a rectangular sub-area of the world called a "window" on the world into a rectangular area of the view surface called a "viewport". By using different window-to-viewport transformations, different views of the same object can be displayed. Parts of the world that fall outside the viewing window are "clipped" off and discarded and are not displayed.

The value of interactive graphics systems is that they provide direct control via the interaction devices (e.g., joystick) of the part of the picture the user wishes to see (window), how he/she wants it displayed (window-to-viewport transformation), and where it is placed on the screen (viewport). Interaction devices may also be used directly to create the output primitives by specifying the endpoints of lines, vertices of polygons, or the color of all objects. Clearly it is the responsibility of either the Core system or GKS to translate the simple numerical values returned by the interaction devices into the appropriate high level quantity. It is the direct control of the computer system by the user (instead of vice versa) that makes interactive computer graphics such an important mode of communicating with a computer.

Current research in graphics technology is concerned with developing faster and more powerful hardware at lower cost, and with creating software to make the hardware appear more intelligent and capable, and make interaction more natural (see box).

Of Mice and Menus -- the Human-Computer Interface

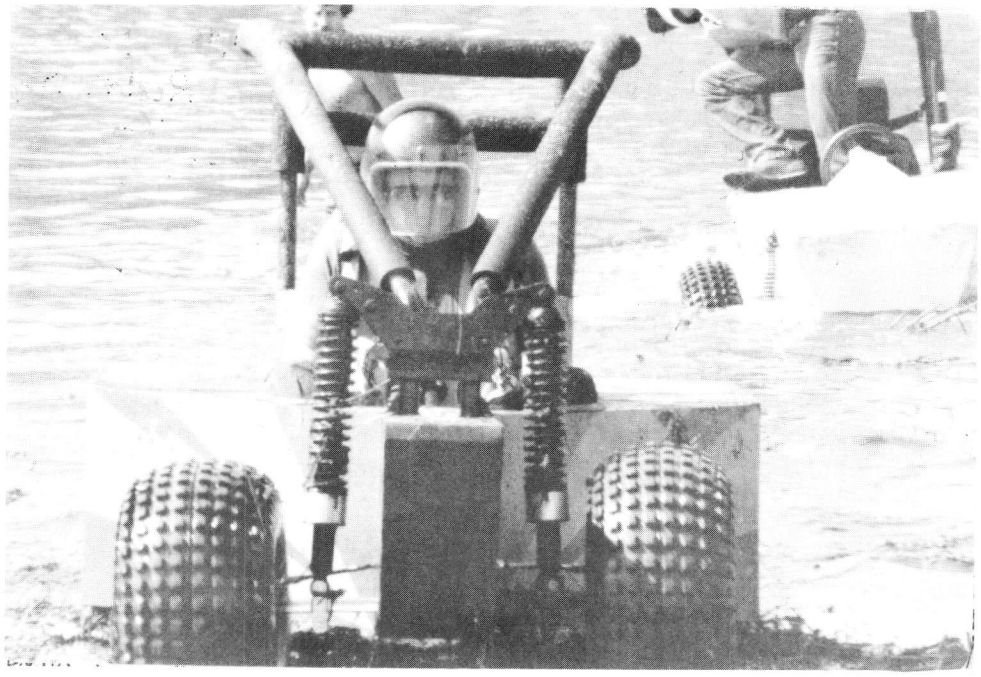
An important concern of those who write interactive computer graphics progams is the design of the interface between the computer system and its user. This interface determines how the actions performed by the user with the interaction devices are interpreted by the computer, and how graphical information produced by the computer is presented to the user. A poorly designed interface can easily result in the rejection of an otherwise well-engineered system by its intended users. Virtually every engineering student has experienced some unnecessary loss of productivity and considerable aggravation caused by the poor design of the university text editor.

Close attention to the human factors of an interface is an essential part of good interface design. An interdisciplinary approach is required since elements of perceptual psychology, cognitive psychology, and linguistics are involved. The basic challenge is to design systems that are understandable to its users, whose facilities are readily invoked, and are forgiving of errors made in the invocation. Such "user-friendly"systems are slowly becoming more widespread. The Apple LISA is representative of this new breed of machines. It provides "Menus" for selecting desired options, a mechanical "mouse" for pointing at items to be selected, and simple means for cancelling undesired actions. Other features of well- crafted interfaces include giving frequent prompting messages to guide the user, providing immediate feedback on the result of all actions, and a "help" facility to provide on-line assistance in using the system.

With more widespread adoption of such interaction aids, the frustration and aggravation that accompanies most initial contacts with a computing system might one day be no more than a distant memory.

Mini Baja at GW

by
Christian Oelsner
and
Ted Delianides



An all-too common complaint from students is the scarcity of real-world engineering problems integrated into their curricula. Engineering students at GWU have the opportunity to develop their practical skills as well as put their classroom learning to the test, by participating in a newly developed research and design program aimed at removing the thorn known as Mini-Baja from the side of the administration.

Each spring, the Society of Automotive Engineers and the American Society of Mechanical Enginners jointly sponsor the Mini-Baja, a regional competition which pits East Coast enginnering schools vying for top honors in a miniature version of the yearly off-road race that made Baja California famous. The contest tests the strength and stamina of vehicles entirely student designed, student built, and student tested and powers by a single 8hp gasoline engine (unaltered in any way) donated by the Briggs and Stratton Company to each registered competing school.

The two-day competition, hosted by the previous year's winner, features a variety of off-road events as well as the all important design creativity, marketability, and safety judging in which participants are assesed points for innovative ideas - all while keeping under a $1,400 estimated production cost. The actual racing includes acceleration, braking, hill climbing, land maneuverability, deep-water maneuverability (which necessitates a mode of water propulsion), and a final day, ten lap endurance race followed by a rigorous post-race inspection,

The history of GWU's participation in the Mini-Baja underlines the need for better organization. In 1980 GWU made its mark by finishing fifth in a field of almost 30 at the University of Delaware. The highlight of the competition was an impressive second place finish in the endurance race. After a year off in 1981, the team in 1982 frantically completed the vehicle in the truck during the trip to the University of Rochester only to have the power train jackshaft snap during the land maneuverability race - clearly underscoring the need for rigorous testing before competition. And finally, in 1983, the vehicle never left the GWU machine shop as a small team working during exam week suffered numerous last-minute design failures the night before the competition, hosted at nearby Ft. Belvoir by the University of Maryland. Clearly, organizational changes were needed for future attempts at competition.

In the past GWU's entry was entirely designed and constructed as an extracurricular project by the ASME student section (under the guidance of Prof. Roger Kaufman) and financially supported jointly by the Engineers' Council and the Civil, Mechanical, and Environmental Engineering Department. In comparison, other universities granted course credit to team members and spent as much as $4,000 toward the construction of the vehicle. The example set by other universities has inspired the CMEE Department to convert the Mini-Baja into a research project from which students will not only acquire practical experience but also receive credit for their efforts - credit which can be applied toward degree programs as technical electives.

Hopefully, this long-needed incentive will encourage enough participation to end the now common sight of a

continued on pg. 24

The Most Sophisticated Training Ground For Nuclear Engineering Isn't On The Ground.

It's on a Navy ship.

The Navy has more than 1,900 reactor-years of nuclear power experience—more than anyone else in America. The Navy has the most sophisticated nuclear equipment in the world. And the Navy operates over half of the nuclear reactors in America.

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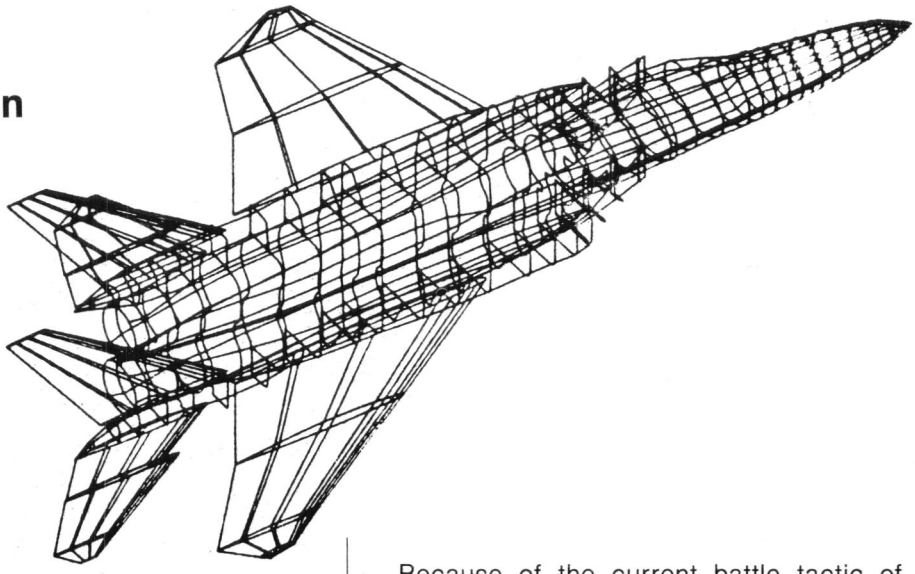
ECM 10/83

Navy Officers Get Responsibility Fast.

The Future of the Figher Aircraft

by

Ayman Jumean



By the mid-1990's at the latest, the U.S. Air Force will need a new fighter to replace the F-15 and the F-16. "Some fighter aircraft manufacturers in the U.S. have expressed the opinion...that the threat capability will warrant the introduction of a new U.S. tactical fighter by the late eighties," according to H. Snyder of Pratt and Whitney Aircraft Group of West Palm Beach, Florida. He expressed this idea in a paper presented at the 27th International Gas Turbine Conference and Exhibit, sponsored by the American Society of Mechanical Engineers and held in London, England, April 18-22.

However, "with realistic funding and timing constraints, a new fighter probably will not be available until the mid-nineties," Snyder said. If the U.S. government elects to choose the new aircraft through competitive fly-off of prototype models, then we will not see it till the mid-nineties.

"Indications are that fighter aircraft technology has advanced to the degree which would warrant the initiation of a new design," Snyder said.

Man's ability to withstand the "G" forces is already taxed with the current fighter models, so there is no room for modifications that increase the aircrafts capabilities in this area. However, there are many other areas where fighters can be improved.

The early nineties fighter will have better and lighter armament and will use beyond-visual-range radar controlled air-to-air missiles. It will also carry a shorter range infrared heat seeking air-to-air missiles

Because of the current battle tactic of "runway denial," the bombing of runways to preclude aircraft takeoff and landing, the new fighter will have to takeoff in less than 1,000 feet. This is not too far from current capabilities. However, it will have to land in the same distance, unaided by a tail hook, and this is much shorter than the capabilities of current fighters.

A prime concern to the Air Force and to the pilots who fly fighters is the aircraft survivability. The aircraft signature alone is sufficient to cause a heat seeking missile to lock on to the aircraft. The infrared signature can be reduced by a special coating. The signature of the engine must also be reduced to increase survivability. Heat seeking missiles are not the only obstacle fighters musdt avoid. Radar detection is a persistant problem and the radar cross-section of the new fighter must be reduced.

The new fighter will be able to cruise supersonically and will accelerate to supersonic velocities much more rapidly. The fighter will also have a considerably longer range than today's tactical aircraft." However, (the desires of the military) will probably be greater than can be accomplished," said Snyder.

Training is the principle use of the fighter aircraft during peace time. Even though these fighters will have supersonic capabilities, the greatest portion of training flights would not employ supersonic speeds. This is because of the great distances covered and the effects on the underlying towns and cities caused by the high energy sonic boom

Because training missions require long hours of subsonic flight, these missions consume the engine's life; thus the engines will have to be designed to withstand the wear and tear of training - more so than the supersonic speeds of combat. Therefore the fighters of the future are just modified models of what we have now. Nothing of those fancy designs in films.

LITE BYTES

Examine the following jokes closely. If you think you can do better, submit your examples to the Humor Editor for consideration. If accepted, they will be included in following issues.

□□□

Overheard on the fourth floor of Tompkins Hall: "I can't be more than one-tenth Male Chauvinist Pig since it does not occur to me to regard more than one woman in ten as a Sex Object".

□□□

Healthy parlourmaid's inconstancy: Hell, the parlour made sin constant, see?

□□□

Roger Kaufman of CMEE tells us that the symbol for multiplication in FORTRAN is called the 'Nathan Hale' operator because he only had one *.

□□□

The doctor looked benignly at the woman who had come to him for an examination. "Mrs. Brown," he said, "I have good news for you."

The woman said, "I'm glad of that, doctor, but I'm Miss Brown."

"Miss Brown,"said the doctor without changing expression, "I have bad news for you."

□□□

Shift to the left,
Shift to the right,
Push down,
Pop up,
Byte, byte, byte.

"I have brought a frog," said the biology teacher, beaming at his class, "fresh from the pond, in order that we might study its outer appearance and later disect it."

He carefully unwrapped the package he carried and inside was a neatly prepared ham sandwich. The teacher looked at it with astonishment. "Odd", he said, "I distinctly remember having eaten my lunch."

□□□

An old engineer, when asked how he felt about having reached the age of 92 replied, "To tell you the truth, I am not pleased with having done so, but I prefer it to the alternative."

□□□

Herodotus tells us of a very religious woman who once prayed that her sons be granted the greatest gift the gods could bestow--and both youths promptly died.

□□□

You can always tell an engineer, but you can't tell him much.

□□□

There once was a young microcomputer
Who turned on to silicon suitors--
But she was longing in vain
For a handsome mainframe--
They all thought the mini's were cuter.

□□□

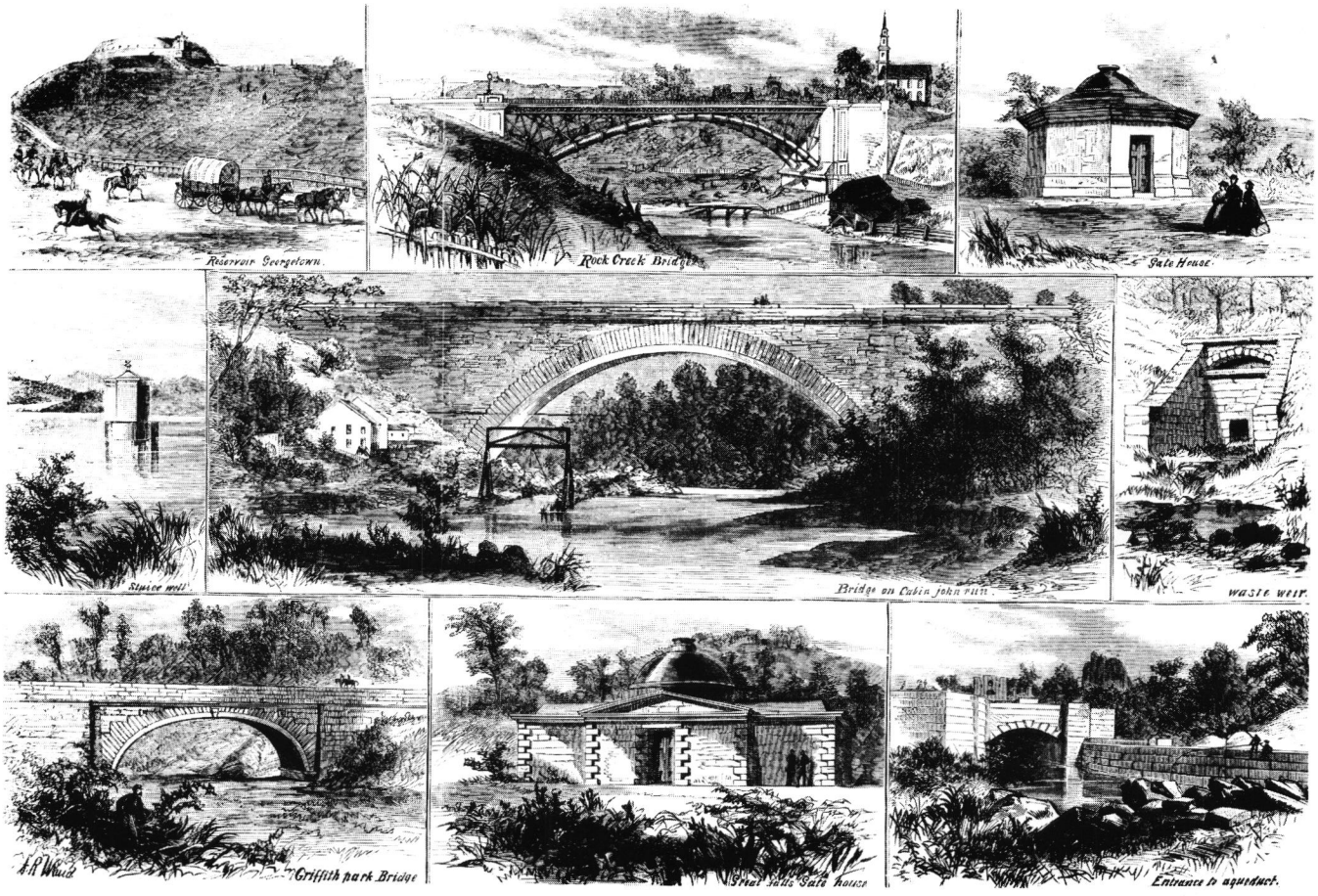
How can you tell when an E&M specialist is the best there is? When he's out standing in his field.

continued on pg. 20

Industrial Archaeology for the Engineer

by

Wm. S. Ellenberger



Do you know that near Washingon, D.C. is a bridge that for 40 years was the longest cut stone arch in the world? Do you know that for almost 60 years one of the principal bridges over Rock Creek connecting Washington with Georgetown was supported, on water mains? Do you know that Washington's water supply was designed by an Army Captain? These and many other facts of historical and technological interest could be discovered by a student of Industrial Archaeology.

Kenneth Hudson defines Industrial Archaeology as "the organized, disciplined study of the physical remains of yesterday's industries." Another source describes it as the study of "industrial monuments." An industrial monument is "any building or other fixed structure - especially of the period of the Industrial Revolution - which either alone or in association with plant or equipment, illustrates or is significantly associated with the beginnings and evolution of industrial and technical processes."

It is logical that such study should have originated in England, home of the Industrial Revolution. Serious British industrial archaeologists are engineers, architects or industrialists who specialize in the study of such fields as: coal and metals, sources of power, railways, inland waterways, roads or building materials.

While the preponderance of work in industrial archaeology has been done in England I should mention growing interest in the United States. Several studies have been carried out by the Smithsonian Museum of History and Technology supplementing the National Park Service's Historic American Buildings Survery. Only recently the American Society of Civil Engineers has undertaken a program of identifying and marking engineering works of historic interest in the United States.

The December 1950 issue of MECHELECIV contains an article by Albert Moe on "Latrobe's Folly." Mr. Moe would not have called his article on the Thomas Viaduct a study in industrial archaeology; the term had not yet come into use. Nevertheless, his article contains much that would be reported by an industrial archaeologist.

The industrial archaeologist examines his subject with care, recording his findings in drawings, photographs and detailed descriptions including old documents and other relevant material. But the mere discovery and accumulation of facts is a sterile activity unless it is followed by analysis and interpretation.

Answers to the questions raised at the beginning of this article are found by the industrial archaeologist studying the Washington Aqueduct, which is the official name of the water supply for the District of Columbia. The city came into existence January 4, 1790 and for the first fifty years an ample supply of potable ground water was available from springs and wells. When the Congress was convinced that an improved public water supply was necessary for the District of Columbia it turned to the Army Corps of Engineers for technical advice. Lt. Montgomery C. Meigs, a 46 year old Engineer Officer, was assigned to make the study. On November 3, 1852, he started what he later stated was the hardest three months work he had ever undertaken. His report submitted February 12, 1853 gave cost and evaluation of three possible water sources. Looking ahead to the future growth of the City of Washington he recommended the Great Falls of the Potomac as a source and an eleven mile aqueduct together with reservoirs and related facilities. The cost of the recommended project would approximate $2 million and would provide 31 million gallons of water per day. The Contress accepted Lt. Meigs' recommendation and made an initial appropriation of $100,000 to start the work. He was promoted to Captain March 3, 1853. Despite the intervention of the Civil War and transfer of the work for a time to the Department of the Interior the aqueduct was put in service in 1863.

Let us now consider the Washington Aqueduct as an "industrial monument" and examine it from the standpoint of industrial archaeology. The aqueduct has undergone improvements, modifications and expansion over the years; however this article will emphasize certain work done in the Meigs' period, 1853-1863. Four major components of the aqueduct will be described somewhat as they would be in an archaeological report.

CABIN JOHN BRIDGE

In the original plan the nine foot circular brick aqueduct from Great Falls was to be carried over Cabin John Creek on a bridge of tall piers and short arches similar to the Roman Aqueducts in Europe. As the plans developed, Meigs, who combined the characteristics of artist and engineer, conceived a single stone arch across the deep creek valley. When completed it was the longest cut stone masonry arch bridge in the world, a record held for forty years. It has a span of 220 feet, a rise of 57 feet and the roadway on top is 101 feet above the water. Three kinds of stone were used in the bridge: granite , gneiss, and sandstone. Their selection was ideal for structural purposes and the variety added to the beauty of the bridge. "The arch ring is constructed of dressed Quincy granite, 4 feet 3 inches thick at the crown and 6 feet 2 inches thick at the springing line. This arch rests on abutments of dressed Port Deposit granite. The granite arch is backed with a secondary arch or rubble arch composed of Seneca sandstone in slabs 10 inches thick, placed in a radial position to the arch. Spandrel arches are rock faced ashler with rubble backing. Foundations are of concrete and abutments and backing of blue gneiss." The red Seneca sandstone gives the bridge an attractive color contrast to its surroundings. These are three other bridges in the aqueduct but none of these has the grandeur of Cabin John Bridge. Its beauty can now be seen to advantage by motorists on the connecting road from George Washington Memorial Parkway to the Capital Beltway as they approach and pass under it. Capt. Meigs did not intend that the bridge be used for highway traffic but as its use increased a parapet was added for safety which enhanced the appearance since the projecting stone courses at the roadway and the parapet give "a cornice like effect in entire harmony with whole design." Unfortunately the 20 foot roadway is a restriction to traffic on McArthur Boulevard and despite reduced speed, passing another vehicle on the bridge is not pleasant.

Some of the methods of construction used in building the bridge are of interest. Old photographs in the National Archives show the heavy timber falsework upon which the arch was built and the steam powered hoisting equipment. The Chesapeake and Ohio Canal was used for transporting construction materials. Near the bridge site a dam and lock were built across Cabin John Creek to permit boats to move up creek to the working area.

continued overleaf

Although the name Cabin John Bridge has been in use since the bridge was completed and is now its official name Capt. Meigs, an ardent Unionist, called it Union Arch. On the east abutment appears the following inscription: "Union Arch Chief Engineer, Capt. Montgomery C. Meigs, U.S. Corps of Engineers Esto Perpetua"
Several other inscriptions were cut in the stone of the bridge by order of Capt. Meigs while it was being built or shortly after its completion. One on the west abutment contains the following information: "Washington Aqueduct Begun A.D. 1853. President of the U.S. Franklin Pierce, Secretary of War Jefferson Davis, Building A.D. 1861 President of the U.S. Abraham Lincoln, Secretary of War, Simon Cameron." During the period when construction was under the Department of the Interior the Secretary, Caleb B. Smith, ordered Jeferson Davis' name removed. Forty-six years later in 1908 President Thoedore Roosevelt ordered its restoration.

DALECARLIA RESERVOIR

The Meigs plan of water supply envisioned an aqueduct from Great Falls and two reservoirs, one a receiving reservoir, the other a distributing reservoir. The receiving reservoir (now called Dalecarlia Reservoir) was made by damming Little Falls Branch, which also served as an auxiliary water supply. It impounded 200 million gallons of water in a 46 acre artificial lake when finished in 1858. Originally it was proposed to build a masonry dam across Little Falls Branch but this was later changed to an earthfill dam to reduce cost. An overflow spillway and a sluice tower were the other principal features of the reservoir. The sluice tower houses the sluice valves originally intended for draining the reservoir or lowering the water level for repairs. The top of the sluice tower stands like a small Greek temple in a watery surrounding. The inscription on the tower tells the story succinctly;"Washington Aqueduct. Built by order of the Congress of the United States for bringing water into Washington. Begun AD1853 on the 8th day of November. Water delivered in Washington from this reservoir AD1859 on the 3rd of January. From the Potomac River AD1863 on the 5th of December."

The original design for the aqueduct included a bypass around Dalecarlia Reservoir. It was deferred until after the water supply was placed in service and was built 1864-1867. Some improvments have been made as a result of conditions unforeseeable at the time. The principal one was the elimination if Little Falls Branch as a water source when it became polluted. A bypass drainage tunnel was completed in 1895. Since that time all water used in Washington has come only from the Potomac River.

GEORGETOWN RESERVOIR

Slow sand filters for water treatment date back to 1829 but it was not until Kirkwood designed the first acceptable American municipal sand filter for Poughkeepsie, New York (1872-1873), that filtration came into general use. Meigs considered that the state of the art at the time did not warrant filters in his water supply system. Furthermore he believed that by placing the receiving and distributing reservoirs in tandem the water would be purified by sedimentation. It was retained in the reservoirs for approximately six days before it went to the city. Heavier river mud settled to the bottom but fine matter remained in suspension giving the water a cloudy appearance. The citizens of Washington were never reconciled to using "muddy water" consequently the city wells continues to be popular for their clear water until they became contaminated and were closed. Filtered water has been supplied to the city since 1905.

A screen chamber and valve vault at the lower end of Georgetown (distributing) Reservoir originally controlled the flow of water into the distribution mains. Here, as elsewhere, Capt. Meigs left his name figuratively and actually on his work. The stairs to the valve vault bear his name boldly- M.C. MEIGS- in the cast iron stair risers.

ROCK CREEK BRIDGE

Of all the structures in the Washington Aqueduct Capt. Meigs was most proud of Cabin John Bridge (already described) and Rock Creek Bridge. The latter was unique in that two 46 inch diameter cast iron pipe arch ribs were to act both as a water conduit and to support a 26 foot roadway. The arch is quite flat, 20 feet rise from the springing line and 200 feet span between sandstone abutments. It is described in considerable detail in a contemporary newspaper report which says in part: "This bridge is particulary remarkable for the double duty which the arch performs. While it supports a roadway, forming a beautiful and much needed communication, by which the traffic between the cities of Washington and Georgetown is carried over, the water of the Washington Aqueduct is conveyed into the city of Washington through the pipes of which the arch is composed. To guard against all danger of freezing, the pipes are lined with staves and resinous pine timber, three inches in thickness, leaving a clear waterway in each rib of three and a half feet in diameter." After almost 60 years of continous service the bridge was replaced in 1916 taking the live and dead load of the bridge off the two water pipes. They are now barely visible from the underside of the new bridge.

An even more noteworthy feature of this bridge was a water power driven pumping engine located in a chamber in the west abutment. It raised 10,000 gallons of water per hour 204 feet to a reservoir a mile away on the heights of Georgetown supplying residents who could not otherwise be served. This reservoir was at the southeast corner of Wisconsin Avenue and R Street on the site now occupied by the Georgetown Branch Library. The pumping engine was designed and built by Henry R. Worthington under his patent of 1855. It was the first pump used for the distribution of water in the District of Columbia and is believed to be the first machine of its type used in this country. Fortunately it has been preserved in the Smithsonian Institution although it is not currently on display. The designer and builder of the pumping engine will be recalled as one of our early mechanical engineers, founder in 1845 of the pump and machinery manufacturing business that still bears his name and as one of the founders of the American Society of Mechanical Engineers in 1880.

ANALYSIS AND INTERPRETATION

The foregoing desciptions and comments are part of what an industrial archaeoligist would develop in a study of the Washington Aqueduct. Earlier in this article it is said that the mere discovery and accumulation of facts is a sterile activity unless it is followed by analysis and interpretation. What can we conclude from the study of this industrial monument? We find two significant conclusions. One relates to the man; the other to his work in the engineering environment of his time. They are closely interrelated.

First consider the man. Engineering has evolved from art to science and technology. In the past there has been a close relationship between art, architecture and engineering. Michelangelo was a sculptor and

architect; Leornardo do Vinci was an artist and engineer. Early in the 19th century architects performed the functions of architect, engineer and constructor. It was during construction of the Washington Aqueduct that architecture and engineering were identified as separate professional disciplines. The American Society of Civil Engineers was founded in 1852; the American Institute of Architects was founded in 1857. Cabin John Bridge and Rock Creek Brige both reveal Capt. Meigs' architectural and engineering abilities. Despite the problems of transportation and communication he exercised close control over large increments of design and construction. The Congress was so impressed with his ability that appropriations contained restrictive wording such as that found in the fiscal year 1861 appropriation: "For the completion of the Washington Aqueduct, five hundred thousand dollars, to be expended according to the plans and estimates of CAPTAIN MEIGS and under his superintendence." His mangerial skill carried the aqueduct to completion despite interrupted appropriations, political intrigue and the Civil War. We conclude that he was a man of strong will and keen mind with a family tradition of stubborn self-reliance and implicit devotion to duty.

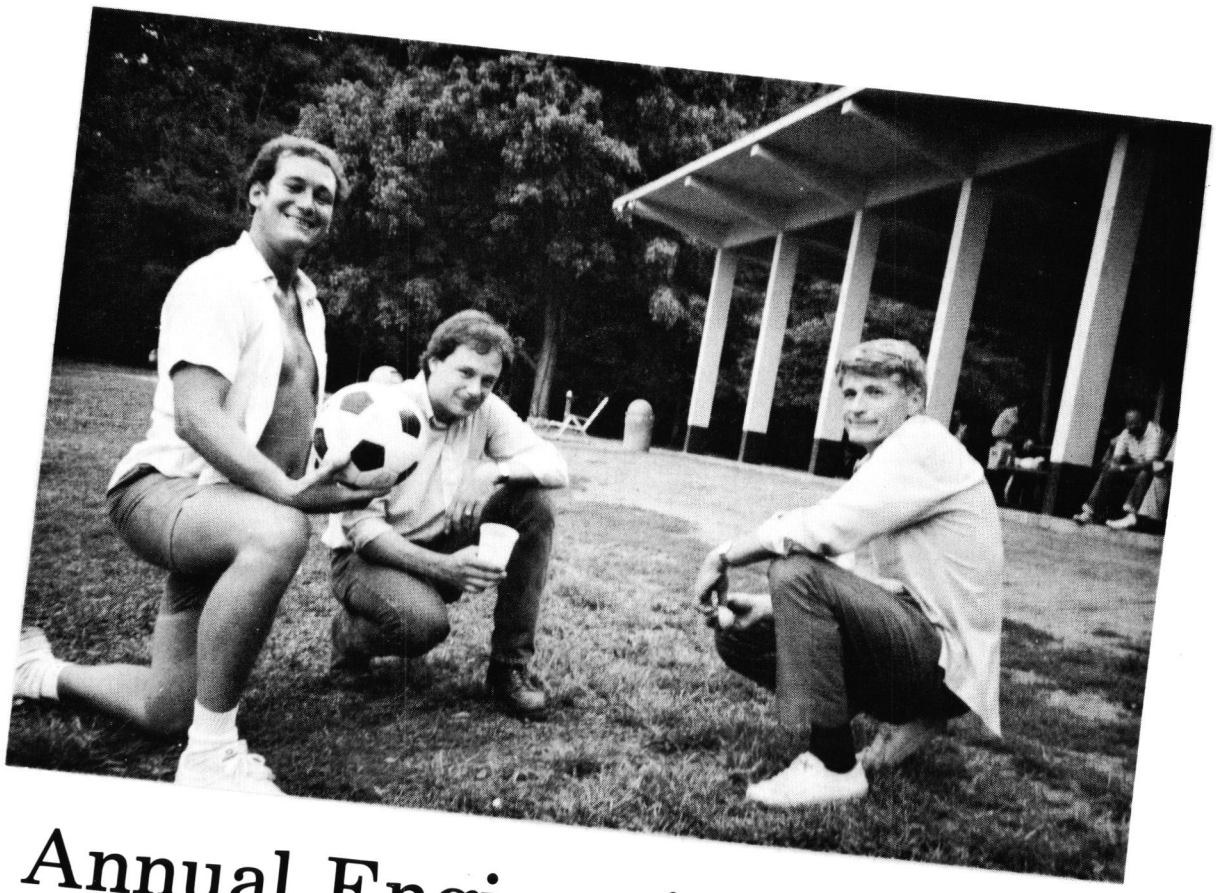
Some of his designs may be criticized, notably the use of cast iron as a structural material. Engineering design at mid 19th century was based largely upon empiricism tempered by one's own experience. As to his general plan for the aqueduct, we must applaud his foresight in recommending a proposal that met the raw water requirements of the city for 63 years and is still in constant use. It was not the cheapest of the three alternatives considered but it paid off in the long run.

Now consider the work in the engineering environment of the time. The construction employed materials and methods proven by experience. Exceptions were the long span over Cabin John Creek, cast iron arches over Rock Creek and the innovation of a water power pumping engine to raise water to the heights above Georgetown. Economical expenditure of appropriated funds dictated foregoing certain desirable refinements. For example tunnels were left rough at the overbreak. Years later they were finished and lined. The specifications for materials and workmanship were typical of the period but grossly inadequate as to technical definition by today's standards. On major projects steam hoisting engines were used but most of the work was hand labor. Inspection methods were personal judgment of the construction inspectors; however construction photographs show cast iron water pipe being subjected to hydrostatic acceptance test. The specifications for the Worthington pumping engine are the epitome of brevity - less than half a page.

Proof of the adequacy of construction lies in the Washington Aqueduct Annual Report for 1909 which says in part: "As a general rule the conduit after 46 years of service is in excellent condition and the brick lining is almost invariably strong and sound." Had the Rock Creek Bridge been built earlier it would have received greater acclaim since it is believed to have been the longest cast iron arch in the world, but by the time it was completed (1862) cast iron was discredited as a structural material.

Capt. Meigs was not the most brilliant technical engineer of his time but he certainly was an engineer of great ability carrying out important public works. After a lifetime of work, most of which was done in and about Washington, D.C. he could have said (quoting Christopher Wren's epitaph) "If you seek his monument, look around."

Reprinted MECHELECIV March 1969



Annual Engineering Picnic

You folks who missed this year's Annual Engineering School Picnic - eat your hearts out!-- because it turned out to be a whole lot of fun. For the 175 people who spent that Saturday at Carderock, it was one of the better picnics the School has had in a number of years.

A day that started off with quite dismal weather, improved dramatically after midday, just in time for the picnic to get underway. There were a number of games organized and food and drinks were plentiful.

The highlight of the day was the Faculty Vs. Student Vs. Alumni Volleyball competition. It was a riot. Diego Rogue of the Engineer Alumni Association (EAA) did a fine job at organizing and refereeing the event. Fortunately the students had two teams-- so while our "A" team was soundly trounced by the faculty (you'll never believe how your seemingly immobile professors move in a Volleyball court), our "B" team was able to redeem the situation. All in all, it was a real fun day.

It is in order that we express our appreciation to the faculty, including professors Maurer, Harrington, Jones, Gilmore, Gross and Soland for recognizing the importance of such get-togethers and for contributing to make the picnic the fun event it turned out to be.

Mrs. Khozeimeh, assistant to the Dean, did a splendid job and eloquently represented the administration - all by herself. If only she could convince her boss to participate personally in such events.

Now, if you didn't make it, don't feel too bad. Next year we'll do an even better job (modest!) and if you all participate, it'll be even more of a success.

Those of you who have no idea what all this is about -- the Annual Engineering School picnic is held every Fall and is sponsored jointly by the Engineers' Council and the Engineer Alumni Association. One of the main needs of a community as diverse and splintered as that at the Engineering School is an abundance, or at least existence, of social events like the picnic, that help bring people together so as to build understanding and cohesion within the School.

It is interesting that the few activities organized to foster this goal, are organized by either the Students or the Alumni. Even the presence of prominent Faculty and Administrators at such events would enhance the significance and importance of such get-togethers.

The picnic is held annually either on the last Saturday in September or the first Saturday in October. So mark the days on your calenders and we'll see you there next year!

The Worm's Eye View

Dear Knucklehead,

This is written to inform you, as a graduating student, that you are not God's gift to the profession. You may have gotten thru college with a decent average and you may have received a big fat offer from an engineering outfit. In your mind you may have already made it to be President of the company with fat cat lifestyles. But think about it again. Have you built anything that hasen't fallen down yet -- including a pair of steps? Have you designed anything that has worked yet? You know you haven't. The company hiring knows it too. That big salary is simply a chance in the lottery that among the few they hire -- one of them- just one, they hope -- might have the potential they are looking for.

I see you as a chick that has pecked his way thru the shell but hasn't quite figured out how to get out of the shell. You've got a lot of work ahead of you simply learning to take that first step on terra firma.

That means going beyond your booklearning to write what you know by learning to write a clear, simple paragraph. It means if the battery is dead in your calculator you learn to multiply 14 times 18. It means understanding what you read by learning to read and absorb data in that form fast. It means when the boss gives you a technical presentation to go over and edit for mistakes, you learn enough about reading and writing to know a mistake when you see one.

If the boss tells you he needs a few changes on a drawing you better know enought about photographic drafting to do it in a hurry. You better be reasonably strong because most of the time you will be walking five steps behind the big wheels carrying the heavy manuals and big map cases.

Do you know how to collate papers? You'd better. That will occupy 50 percent of your first big-salary-job...running the Xerox machine and putting a document together.

You'll need to know where the coffee machine is -- you will be carrying a lot of it and you had better know where the reference books are-- you will be sent to check into tons of them.

Dates at night are out. It is expected that you will work past midnight checking figures -- you better hope your calculator works, running revised copies -- and fixing the machine when it breaks down at midnight, and knowing what good friend to call at 2AM, who really knows the stuff, to ask for advice to bail you out.

Lots of chewing gum is recommended to keep your mouth shut when the boss makes a point that you think is wrong. He didn't hire you to correct him and remember if you correct mistakes in a written paper -- it is always the typist's error.

You better know computer theory and some operations. Bosses don't need to be bothered with computer programs, with input problems or with verification -- that nitty gritty job is yours, buddy. If you are female -- better know how to type -- even if it is "one finger" typing. This is what you'll be doing for that big salary. Like young lawyer associates you will be a high paid "go-for"the nitty gritty stuff. There'll be no "Presidential" responsibilities for you. I've seen young engineers that didn't know how to set up the conference room for the boss. If you're one of those unfortunates, you can luck through if you have fot friendly with the secretarial staff but, if you have thrown your weight around too much and look down on them -- they aren't going to help you but to hang you.

I hate seeing so many of you fall on your face so here's some hints: roll the viewing screen out full at the right height. Make sure a pencial and pad are at each place, astrays, coffect, etc. And for heavens sake know how to fix the viewgraph or the video if it goes off in the middle. In the first place, you'd better make sure its OK and won't go off. If a graphic is fowled up or an equation or statistic is not right -- YOU DID IT, yes you did. Even if you had never seen the thing.

And don't forget your name is not big shot, behind closed doors your name is knucklehead -- you know the one we got from school. You are a knucklehead from their point of view no matter what they pay you because you know nothing about the psychology of selling, nothing about union contracts, nothing about corporate finance. And because you can't do the bosses job for him when he is so hung over from entertaining the customer the night before he can't even read his presentation, when he is so ego ridden that he wouldn't change his ways for the Lord himself and can't really put it over. And they know you're a knucklehead because they all started out as knuckleheads themselves. That is your only ray of hope: the bosses were knuckleheads and many of them still are, they somehow outlasted their competition -- find out how they did it. It worked didn't it?

It might be a good idea to keep abreast of changes in engineering. If you aren't God's gift, maybe you can avoid being God's curse to the profession. Finally, it you can't make it this way, don't worry. There are lots of jobs waiting at universities for professors, nobody there will ever know about your past.

The Worm

Resume Writing for Engineering students

by

Barbara Fitzgerald-McClain

What Is the Importance and Use of a Resume?

• Your resume represents you to the potential employer -your skills, competencies, experiences, and qualifications that will produce results for the eemployer.

• Your resume will never get you a job. If it gets you an interview, it has done its job. The purpose of a resume is to trigger the employer's interest in you.

• Typically, resumes are screened by the employer to determine who is to be interviewed.

What Should You Include in the Content of your Resume?

• Make sure that what you have to say is defined before you start writing. In other words, the format should follow the content - not vice versa.

• Start with the most impressive qualification you have (usually Education or Experience). The resume is read from the top down, so first things first.

• If your resume is chronological, start with the most recent experience and work backwards.

• Present your achievements with the employer's needs in mind.

• It is much more important to emphasize what your experience and accomplishments are (descripion, explanation) than where and when (places and dates).

• In addition to specific experiences and accomplishments, your resume can represent you as a motivated, enthusiastic, and interesting individual. These characterisitics can make the employer want to interview you.

• Use "References Available Upon Request", rather than listing names and addresses.

• Personal information (age, marital status, etc.) is usually unrelated and should not be included in your resume.

• Corporate recruiters, such as Richard Bache, of Sperry Systems Management, assert that it "will be normally assumed you are a citizen unless you have a name that suggests alien status". Since many technical firms require some type of clearance, a simple phrase about citizenship status at the bottom of your resume is to your advantage.

For the recent (or soon to be) college graduate who does not have an impressive work record:

• Make sure you get all the credit you can for academic achievements. If impressive, list grade-point average. Mention relevant term papers, research projects or major courses taken in a section that can be labeled "Educational Highlights".

• Extracurricular and volunteer activities can indicate your skills and motivation to an employer.

• Internships or cooperative education experiences carry the same impact as paid positions. They should be included in the "Experience" section. Organizations more and more are seeking experienced engineers; emphasizing any career-related experience, summer, part-time jobs, or cooperative education, is vital.

• If you decide to state your job objectives at the top of your resume make sure it is in as specific terms as possible; such as job functions you seek to perform or skills you would like to utilize. If you cannot be specific, do not use an objective and state your goals in your cover letter.

Hints on Wording

• Avoid using personal pronouns. The subject of every phrase "I" is redundant when used repeatedly. Start with the verb.

- Use an outline format, short sentences, or concise phrases.

- Focus on what you have accomplished, not descriptions of organizations or the context of the experiences.

- Avoid uncommon abbreviations

- Use the jargon of the field to which you are applying. This is particularly important for a technical student.

- Wherever possible, refer to specific projects with measurable (quantified) results.

What You Should Know About Layout and Reproduction

- Visual impressions are important. Make sure your resume is a quality product.

- One page is preferred.

- Name, adddress, and telephone number should be prominently placed. Do not forget area and ZIP codes.

- Make sure the page is not top crowded

- Use margins and spacing appropriately.

- Center your resume on the page.

- Make sure it is proofread by at least two people.

- The cut of an electric typewriter is best.

- Select heavy grade, high quality paper.

- It is expected that your resume be reproduced by a suitable printing process; original, typed copies are usually of poor quality and unacceptable. From professional printers, there are usually several choices including:

Offset - using your typed camera-ready resume for printing.

Word Processing - if you are planning to develop resumes targeted to individual employers, this process allows easy modification of information.

Resume Assistance Available at Career Services (CSC),

Located in the Academic Center T509 the CSC offers various services to assist you in your job search. Stop by CSC for further details. Call 676-6495.

Use the samples provided in this article only as samples. Make sure your resume is original and not simply patterned after these or other samples.

Resume workshops are available on a regularly scheduled basis.

Additional resume samples are available in the CSC.

Resume critiquing sessions with the liason to SEAS available during scheduled walk-in hours.

Pamela M. Paul

WORK EXPERIENCE

Burroughs Corporation Piscataway, New Jersey

Management Systems Analyst (May 1981-present)

--Analyzed, coded, debugged, and maintained the purchasing engineering budget database, repair product and product information database systems, interfaced with systems' users.
--Developed and designed programs to enhance more efficient user communication with their appropriate systems and the Computer. Developed on-line screen input programs.
--Designed and maintained the configuration of the Data Communication Network.
--Brought up newly released software packages from World headquarters. This involved troubleshooting and modification of software packages to meet plant's particular configurations and needs.

Assistant Management Systems Analyst (May 1980-May 1981)

--Worked closely with manufacturing analysts in developing new programs to provide better communication between users, their systems, and the computer.
--Assisted analyst in designing an order control system. Developed an on-line shipping authorization program. Analyzed, coded debugged, and maintained quality control and repair product systems; interfaced with systems' users.

IBM Corporation Gaithersburg, MD

Computer Programmer/Operator (June 1979-May 1980)

--Converted manufacturing systems from a medium computer system to a large computer system. This involved filtering programs, debugging, and testing of the converted systems.
--Designed programs requested by systems analysts and Data Center Manager.
--Operated a large computer system (B6700).

EDUCATION

B.S. Electrical Engineering, George Washington University, Washington, D.C. 1979.

Operating Systems Design	Non-Numerical Methods
Discrete Structures	and Computer Programming
Computer Architecture	Applied Numerical Methods
Logic Design	Combination Theory
Assembler I, II	Numberical Methods

Familiarity with the following languages:
ALGOL, COBOL, FORTRAN, PL/1, Assembler, JCL

COMPUTER SYSTEMS

Burroughs 6700, Burroughs 5500, IBM 370

REFERENCES AVAILABLE UPON REQUEST.

BAVEESH VAASHII

123 Forbes Lane, #102
Vienna, VA 22180
(703) 971-8362

EDUCATION

B.S. Mechanical Engineering,
George Washington University
Washington, D.C., May 1984

Course Highlights
Machine Design, Heat Transfer, Fluid Mechanics, Thermodynamics, Materials Engineering, Relativistic Physics, Vibrations, Electronics Engineering, BASIC, FORTRAN.

Research Projects
"Solar Heating and Cooling of Buildings"
"Design of a Coupon Inserter Machine"
"Impact of Computers on Engineering Management"
"Automatic Jar Opener"

EXPERIENCE

Engineering Assistant -- COMSAT General Telesytem, Fairfax, VA
Reproduced drawings and artworks. Write and incorporate Engineering Change Orders. Inform all departments of any releases and/or changes from engineering department. (2/83-10/83)

Bartender — Westpark Hotel, Rosslyn, VA (10/82-2/83)

Teller -- First Virginia Bank, Annandale, VA
Handle $30,000 average daily transactions. (9/81-9/82)

LANGUAGES

French and Arabic, fluent; some German.

EXTRACURRICULAR

Active member ASME; Intramural volleyball team; electronic hobbyist.

PERSONAL

Permanent VISA; U.S. citizenship to be acquired in February 1984.

ADDITIONAL INFORMATION

Willing to relocate and/or travel.

REFERENCES

Available upon request.

Lite Bytes *continued*

Said the sweet young lady, "Oh, I see how astronomers figure out the distance of the stars and their sizes and temperatures and all that. But what really gets me is how they find out what their names are."

□□□

You can lead a horticulture, but you can't make her think.

□□□

Three brothers went out West to establish a cattle ranch. When they couldn't think of an appropriate name for their ranch, they wrote to their father back East. He replied, "Call it Focus, for that's where the sun's rays meet."

□□□

What did the elephant say to the naked man? "How do you breathe through that little thing?"

□□□

Palindromes:

"Naomi, sex at noon taxes," I moan.
Was it a bar or a bat I saw?
Norma is as selfless as I am, Ron.
He goddamn mad dog, eh?
Doc, note: I dissent. A fast never prevents fatness. I diet on cod.
You can cage a swallow, can't you, but you can't swallow a cage, can you?
Girl, bathing on Bikini, eying boy, finds boy eying bikini on bathing girl.

Spoonerisms:

Is the bean dizzy?
I have only a half-warmed fish.
The fog was thick as sea poop.
To farmers: I have never before addressed so many tons of soil.

A newcomer to a certain summer resort was surprised to find a group of men gathered on the lawn one evening shouting numbers at each other.

"Sixteen", one would yell. and all would laugh.

"One hundred and thirty-five", another would say, and all would laugh again. The newcomer watched as this happened several more times.

Then, when someone shouted "Two hundred and three', everyone fell off his chair howling. It was quite a while before the laughter died down enough for other numbers to be called, and the response was more subdued.

Finally, the newcomer spoke to one of the men on the fringes and said,"Pardon me, but tell me what is going on."

"Well", said the other, "this group meets every year at this resort and night after night we swap stories. Naturally, we know all the stories, so we gave them numbers and save time by calling the numbers."

The newcomer nodded. "I see. But tell me this. When someone shouted 'two hundred and three', everyone laughed particularly loudly. Why was that?"

His informant chuckled. "Oh! Well, you see, that one we had never heard before."

□□□

Two engineers joined the cavalry and got horses they couldn't tell apart; so one said he would cut the mane off his. That was ok until it grew back in. So the other said he would cut the tail off his, and that was ok until the tail grew back in. Then they decided to measure them by hands, and the black one was two hands higher than the white one.

Latest from Headquarters

After over a decade of relative inactivity, the Engineer's Council is endeavoring to regain its role and significance in the day to day life of the Engineering School and the University. It is actively becoming involved in defining its new responsibilities as a representative body responsive to the current student community whose nature and needs have evolved considerably over almost half a century of the existence of the Engineer's Council at the George Washington Univeristy. In doing so, the council is also reestablishing many traditions of the school.

Ties with the Engineer Alumni Association are being strengthened with a number of events being planned to bring students and alumni together. The success of this year's annual school picnic (see page 16) can be attributed to these efforts. The revival of the MECHELECIV (which is one of the undertakings of this year's council) will also serve to strengthen ties between the students and the alumni.

The Davis-Hodgkins House for Engineering School Students had been allowed to deteriorate to a state where both internally and externally it disgraced rather than graced the University landscape. The council took the initiative in committing its funds and efforts for the renovation of the D-H House. The University administration has been supportive of the council's efforts to renovate the building. The D-H House is an important asset of the Engineering Students' community. It provides numerous facilities for the students and serves as the only place in the Engineering School where students can relax between classes and socialize.

However, work on the D-H House has come to a virtual standstill, much to the dissappointment of the council which sees many of its ambitious plans not reaching the culmination. In talking with members of the council, they expressed appreciation of Vice-President William Smith; of Director of the Physical Plant, Mr. Robert Burch; and of the Research and Resources office in the School, in particular Mr. Donald Huttenlocker, with the hope that the administration will soon complete all pending work on the D-H House.

One of the major social events of the University is the Annual Engineer's Ball, organized and sponsored by the council. The council is putting a major effort into this event and preparations are already underway. The Ball will be held probably on Saturday, February 25, 1984. Plans include an open buffet, beer, and wine, mixed drinks, an excellent rock band, and for the first time — live dinner music and an award ceremony. Live entertainment by students, professors and alumni is also being considered. Anyone with constructive ideas or talents (silly or serious) interested in becoming part of this magnificant event is requested to get in touch with the Engineers' Council at the David-Hudgkins House or call 676-6744.

The Engineer's week is another major undertaking of the council. This year, the council plans to hold its Engineer's week activities during the week of February 6, 1984. The Council is working with the Engineer Alumni Association and the Career Services Center in organizing a variety of events during Engineers Week. Plans include lectuers, movies (both feature and documentary), career counselling, exhibitions by industry, job interviews, competitions and functions.

The Engineers Council will be sponsoring the annual Egg Drop Contest to be held in conjunction with ENGINEERS WEEK.

The Egg Drop Contest is traditionally held on the Friday of Engineers week. The contest is a test of ingenuity and basic engineering principles. The idea is to drop a raw egg in some form of support structure, from the top of Tompkins Hall and to have it hit a target directly below the drop point, without the egg breaking (into a messy glob). The judges look at the following criteria when selecting the winner:

a. Did the egg survive the drop (disqualified if it breaks)

b. The distance of the point of impact from the target.

c. The distance of the final resting place from the target

d. The weight of the structure used to transport the egg.

e. The time it takes to hit the ground.

All these criteria are weighed accordingly and there are also restrictions on the dimensions of the structure used (typically 70cm in all directions).

The winners will be awarded a cash prize and a certificate. The prizes are $50 for first, $25 for second and $10 for third. All those interested in participating in the contest and in the Engineer's Week activities should contact the Engineer's Council at the Davis-Hodgkins House, 2142 G Street, NW or call 676-6744 for more information.

COMPETITIONS

FOR THE DESIGN OF:

— ENGINEERING SCHOOL T-SHIRTS
— ENGINEERING SCHOOL STICKERS
— ENGINEERING SCHOOL BROACHES

(Design for other items such as Mugs, Ties, etc. may be submitted at designers initiative.)

WINNING DESIGNS WILL RECEIVE:

— 2 FREE ITEMS FOR THEIR DESIGN
— $30 EXTRA BONUS FOR SUPERIOR DESIGNS

FOR THE DESIGN OF:

ENGINEER'S COUNCIL LOGO/EMBLEM

WINNING DESIGN WILL RECEIVE:

— 30 DOLLARS
— EXTRA $25 FOR SUPERIOR DESIGNS

DESIGN GUIDELINES

ALL DESIGNS SHOULD REFLECT ONE OR MORE OF THE FOLLOWING THEMES:

— GWU Engineering
— 100 years of GWU Engineering School
— Engineering Council
— Engineering Students

COMPETITIONS

SUBMIT ALL DESIGNS IN A SEALED ENVELOPE TO:

President
Engineering Council
School of Engineering and
Applied Science
The George Washington
University
Washington, D.C. 20052

ALL ENTRIES MUST INCLUDE THE FOLLOWING INFORMATION:

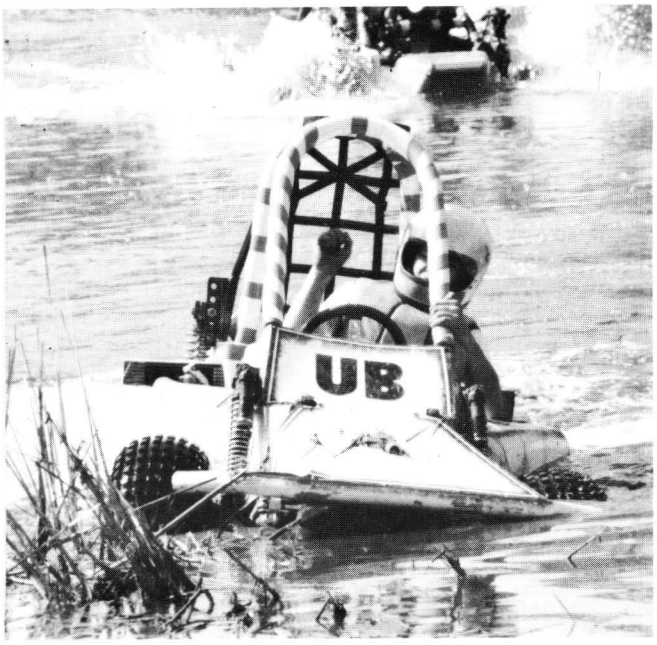
NAME
SCHOOL/DEPT.
ADDRESS
PHONE NUMBER

COMPETITIONS ARE OPEN TO ALL OF GWU COMMUNITY

ALL ENTRIES MUST BE SUBMITTED BY DEC. 31, 1983

LIST OF ALL THE WINNERS TOGETHER WITH THE WINNING DESIGNS WILL BE PUBLISHED IN JANUARY 84 ISSUE OF MECHELECIV.

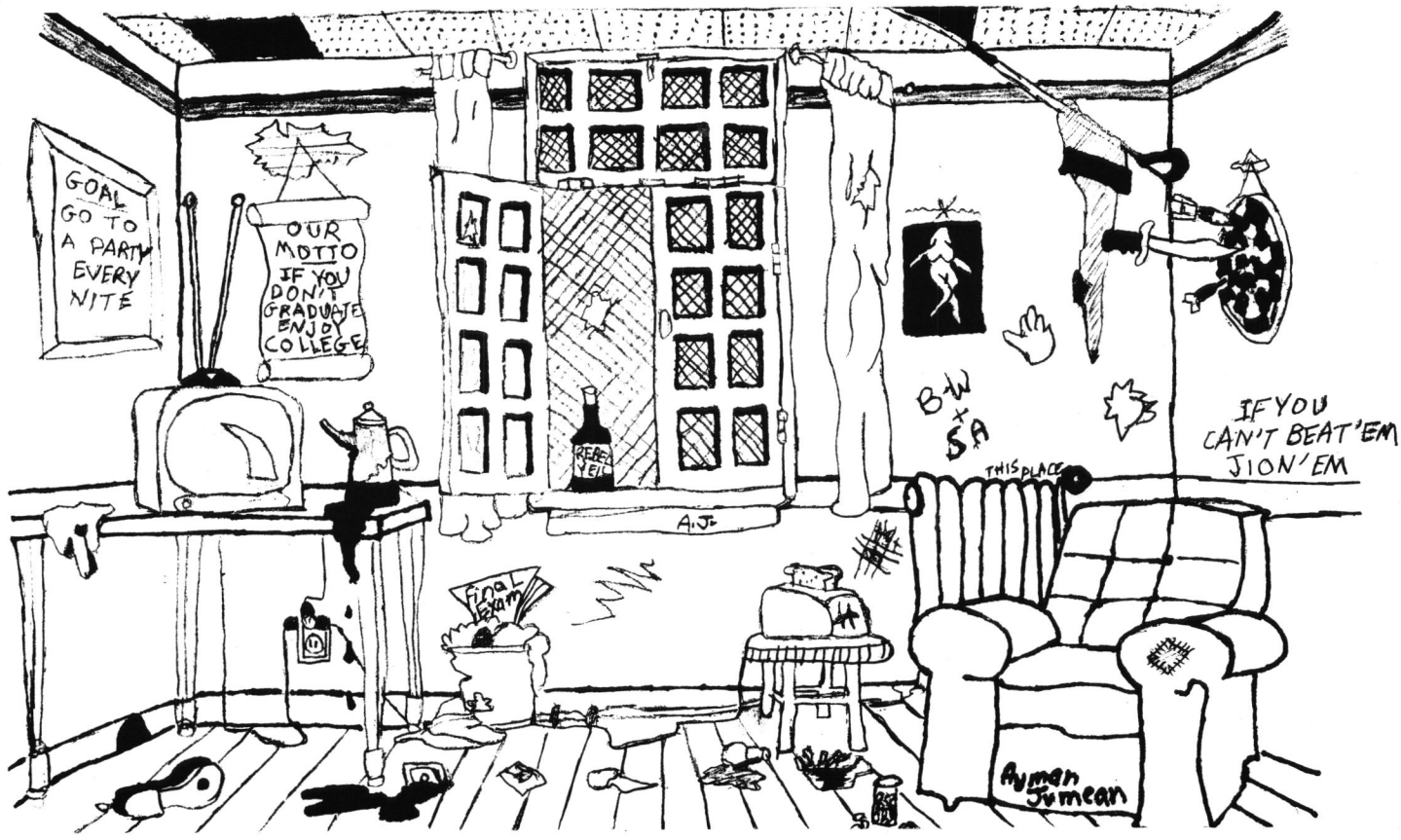
Only in exceptional situations will the deadline be extended till the end of winter vacation.
All material submitted will become the property of MECHELECIV.
NOTE: No person will receive more than two prizes. Refer all questions to MECHELECIV staff or the Engineer's Council at D-H House or call 676-3998 or 676-6744.



Vehicles in action at previous Baja competitions

Mini Baja *continued*

small group futilely trying to complete the vehicle in the waning hours before the competition. Recently, the GWU ASME student section held an organizational meeting detailing the latest progress in the new program. Overall, the students' reactions were favorable, and a large turnout is expected for the spring course. Already, students are laying the groundwork for what should be a very successful year for Mini-Baja.



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The George Washington University
Davis-Hodgkins House
2142 G Street, N.W.
Washington, D.C. 20052

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